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IS 1063 (1997): Automotive Vehicles - M14 X 1.25 Spark Plugs with Flat Seating and Their Cylinder Head Housing
[TED 11: Automotive Electrical Equipment]

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भारतीय मानक

स्वचल वाहन — सपाट बैठने वाले एम14 × 1.25 स्पार्क
प्लग तथा उनके सिलिंडर शीर्ष में फिटिंग — विशिष्टि
(द्वासरा पुनरीक्षण)

Indian Standard

AUTOMOTIVE VEHICLES — M14 × 1.25
SPARK PLUGS WITH FLAT SEATING AND
THEIR CYLINDER HEAD HOUSING —
SPECIFICATION

(*Second Revision*)

ICS 43.060.50

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NEW DELHI 110002

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Automotive Electrical Equipment Sectional Committee had been approved by the Transport Engineering Division Council.

This standard was first published in 1957 and it covered the plugs of body reach 12.5 mm only and it was subsequently revised in 1963. During the first revision the plugs of body reaches 9.5 mm and 19 mm which were in extensive use were also included. The first revision was based on the following publications:

DIN 72502-1959 'Sparkling plugs M14 × 1.25' issued by DIN, Germany.

JISD 5101-1954 'Automobile sparkling plugs' issued by the Japanese Industrial Standards Committee.

This second revision has been undertaken to incorporate the latest developments in the technology in this field and during this second revision the standard has been brought in line with ISO 1919-1988 'Road vehicles — M14 × 1.25 spark plugs with flat seating and their cylinder head housing' with the addition of short reach spark plug dimensions.

The committee responsible for the preparation of this standard is given in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

**AUTOMOTIVE VEHICLES — M14 × 1.25
SPARK PLUGS WITH FLAT SEATING AND
THEIR CYLINDER HEAD HOUSING —
SPECIFICATION**

(Second Revision)

1 SCOPE

This standard specifies the main characteristics of M14 × 1.25 spark plugs with flat seating with short, normal or long reach and their cylinder head housing, for use with spark ignition engines.

2 REFERENCES

2.1 The following standards contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
1062 : 1963	Methods of test for sparking plugs (<i>revised</i>)
4218	ISO Metric screw threads:
(Part 1) : 1976	Basic and design profiles (<i>first revision</i>)
(Part 2) : 1976	Diameter pitch combinations (<i>first revision</i>)
(Part 3) : 1976	Basic dimensions for design profiles (<i>first revision</i>)
(Part 4) : 1976	Tolerancing system (<i>first revision</i>)
(Part 5) : 1979	Tolerances (<i>first revision</i>)

3 REQUIREMENTS

3.1 Terminals

The spark plug terminal may be either threaded or the solid post type. If nuts are used they shall have the same external dimensions as those of solid post terminals [see Fig 1(a) and 1(b)].

3.2 Dimensions and Threads (see Fig. 1 to 3)

3.2.1 Spark Plug Reach

The spark plug reach shall meet the requirements specified in Table 1.

Table 1 Dimensions of Reach of Spark Plugs
(Clause 3.2.1)

All dimensions in millimetres.

Type of Reach	<i>A</i> ±0.2	<i>B, Max</i>	<i>Y</i> ±0.3
Short reach	9.5	17.5	9.2
Normal reach	12.7	21	11.7
Long reach	19	27	18

NOTE — Dimension *A* may be increased for special applications.

3.2.2 Gasket

When the spark plugs have been tightened with a torque of 30 Nm, on threads that are clean, smooth and dry, the gaskets shall be 1.3 mm to 2 mm thick. If the gasket thicknesses are different, a corresponding adjustment to dimension *A*, *B* and *Y* shall be made. Non-captive gaskets may be used in special cases.

3.2.3 Threads

3.2.3.1 Spark plug and cylinder head

The threads M14 × 1.25 of spark plugs and the corresponding tapped holes in the cylinder head shall conform to IS 4218 (Part 1 to 5). Their limiting dimension and their tolerance classes shall be as specified in 3.2.3.2 and 3.2.3.3 respectively.

3.2.3.2 Limiting dimensions

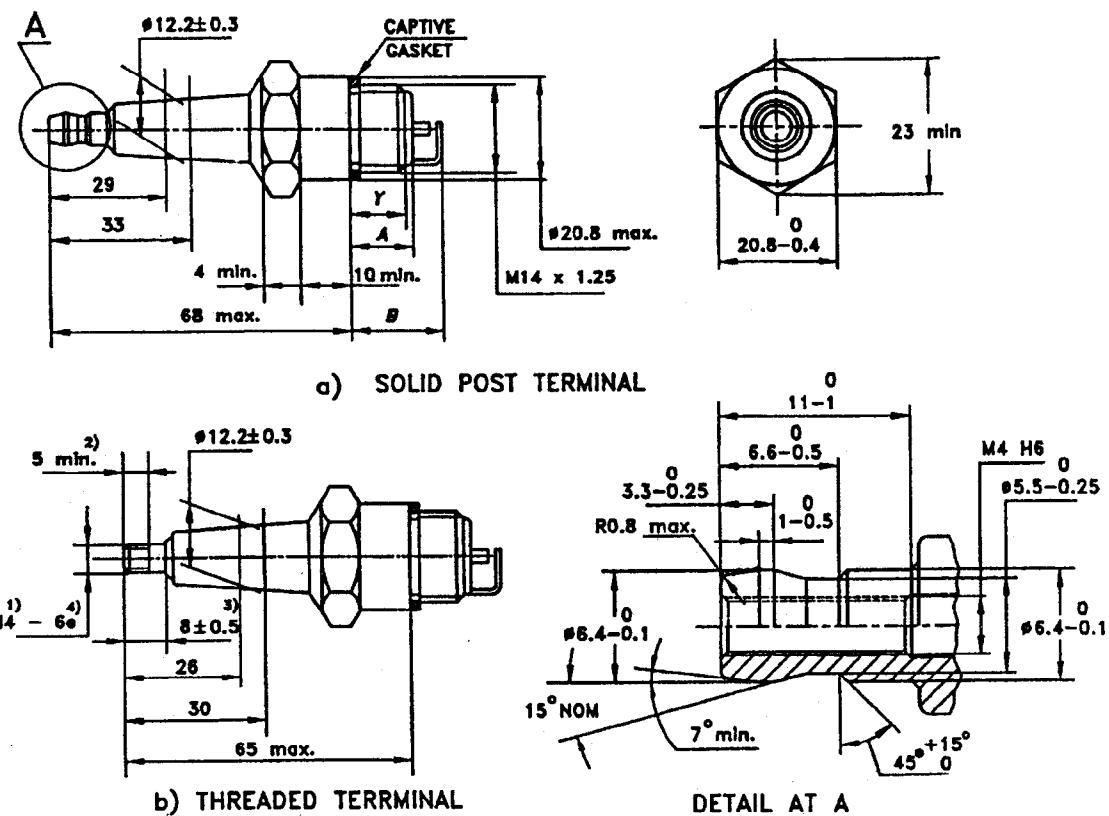
The limiting dimensions shall be as given in Table 2.

Table 2 Dimensions of M14 × 1.25 Thread Profile
(Clause 3.2.3.2)

All dimensions in millimetres.

Dimension	<i>Plug Thread</i> (on Finished Plug)	Tapped Hole in Cylinder Head
Major diameter	<i>Max</i>	13.937
	<i>Min</i>	13.725
Pitch diameter	<i>Max</i>	13.125
	<i>Min</i>	12.993
Minor diameter	<i>Max</i>	12.404
	<i>Min</i>	12.181 ¹⁾

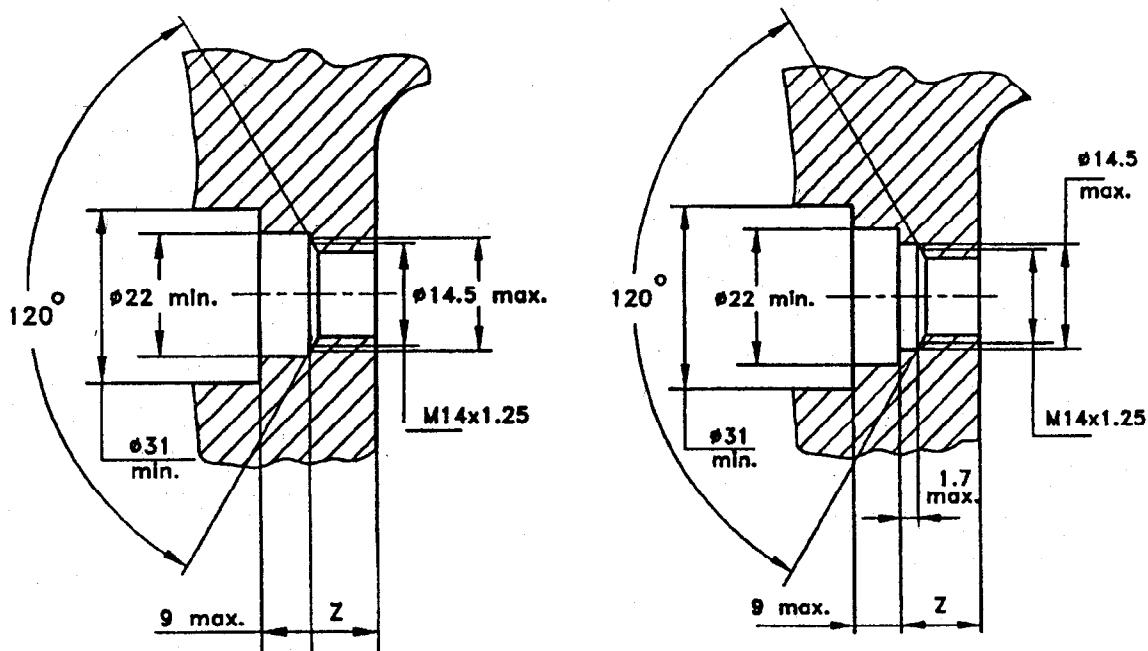
¹⁾With a root radius ≥ 0.125 mm (0.1P).



- 1) 0.7 mm pitch complying with ISO 68 and with ISO 261.
- 2) Length of usable thread.
- 3) Cylindrical part.
- 4) Depending on manufacturing processes, class 7e is acceptable on the finished product.
- 5) Other dimensions: see Fig. (a).

All dimensions in millimetres.

FIG. 1 M14 x 1.25 SPARK PLUG WITH FLAT SEATING



All dimensions in millimetres.

FIG. 2 HOUSING OF SPARK PLUG IN CYLINDER HEAD

All dimensions in millimetres.

FIG. 3 OPTIONAL CONFIGURATION OF HOUSING IN CYLINDER HEAD

3.2.3.3 Tolerance classes

The thread tolerance classes for finished M14 × 1.25 spark plugs and of the corresponding tapped holes in the cylinder head shall be as follows:

6e for spark plugs (see Note 1)

6H for tapped holes in the cylinder head.

NOTES

1 In order that spark plugs complying with this standard can be fitted in existing cylinder heads also in extreme cases, the value for the maximum truncation of the minor diameter of the spark plug base has been slightly reduced with respect to the ISO value.

This maximum value of the minor diameter is calculated from a distance of $H/6$ for the maximum truncation according to the formula given below. Instead of the value given by the formula in the standard.

$$\begin{aligned}\text{Minor diameter, } Max &= d_1 - es - 2(H/4 - H/6) \\ &= 12.647 - 0.063 - 0.180 \\ &= 12.647 - 0.243 \\ &= 12.404\end{aligned}$$

The value for the basic profile remains the same as for the ISO thread ($12.647 - 0.063 = 12.584$).

2 The initial clearance ($e = 0.063$ mm) between the pitch diameters of the thread and of the tapped hole is intended to prevent the possibility of seizure, as a result of combustion deposits on the bare threads, when removing the spark plugs.

This clearance is also intended to enable spark plugs with threads in accordance with this standard to be fitted in existing tapped holes.

3.2.3.4 Threaded terminal

For the terminal thread, the thread tolerance class shall be 6e [see Fig. 1(b)].

NOTE — Depending on manufacturing processes, class 7e is acceptable on the finished product.

Nuts for use with threaded terminals shall have internal threads to 6H tolerance prior to assembly.

3.3 Other Dimensions of Spark Plug and Housing in Cylinder Head

The other dimensions shall be as indicated in Fig. 1, 2 and 3.

The contour of the insulator is optional; however, between the reference planes defined for spark plugs with threaded terminals by the dimensions 26 mm and 30 mm, and for spark plugs with solid terminal post by the dimensions 29 mm and 33 mm, its largest diameter shall be 12.2 ± 0.3 mm.

The Z length of the spark plug housing in the cylinder head shall be sufficient to ensure that the end of the spark plug thread does not project into the combustion chamber at any point when the gasket is tightened to its maximum specified compression.

Details that are not specified in the standard shall be left to choice of the manufacturer.

3.4 Installation Tightening Torque

The installation torque values apply to new spark plugs without lubricant on the threads. If threads are lubricated, the torque value shall be reduced by approximate one-third to avoid over stressing.

Spark plugs shall be tightened with a torque of 20 Nm to 30 Nm in aluminium cylinder heads, and 20 Nm to 40 Nm in cast iron cylinder heads.

3.4.1 The engine manufacturers may specify a different torque while installing a spark plug for the first time.

4 ACCEPTANCE TESTS AND REQUIREMENTS

4.1 The acceptance tests which are carried out on samples for the purpose of acceptance of a lot, shall be carried out in accordance with the methods prescribed in IS 1062 and the plugs shall comply with the requirements given in Table 3.

**Table 3 Requirements for Sparking Plugs
(Clause 4.1)**

SI No.	Test	Requirement
i)	Sparking under pressure	Sparking shall be regular and of equal intensity
ii)	Insulation resistance under heat, Min	1 megohm
iii)	Gas leakage under room temperature, Max	5 ml per min
iv)	Gas leakage under heat, Max	50 ml per min
v)	Thermal shock test	There shall be no crack on the insulators
vi)	Mechanical impact strength of insulator	
a)	Impact energy, the plugs shall sustain, Min	1.5 kgf. cm
b)	Breaking impact energy, average	33 kgf. cm
vii)	Torque strength	No breakage at the throat

5 SAMPLING

5.1 The sampling procedure shall be subject to agreement between the supplier and the purchaser. As a guide to this agreement, a recommended sampling plan is given in Annex A.

6 INSPECTION AND TESTING FACILITIES

6.1 The manufacturer shall afford to the purchaser or his authorized representative, subject to prior agreement, all testing facilities for satisfying himself that sparking plugs are being or have been manufactured fully in accordance with the requirements of this standard, and for this purpose the purchaser or his representative shall have

access, at all reasonable times, to the manufacturer's or supplier's premises, and may require him to deliver representative samples for inspection and tests at the manufacturer or suppliers' premises or at any other place mutually agreed upon.

7 MARKING

7.1 Each spark plug shall be legibly and indelibly marked with the following:

- a) Manufacturer's name or registered trademark,
- b) Lot or batch number, and
- c) Country of manufacture.

7.2 BIS Certification Marking

The product may also be marked with Standard Mark.

7.2.1 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

8 PACKING

8.1 The threaded portion of the plug shall be lightly smeared with oil or grease and protected against risk of mechanical injury by means of a cardboard sleeve. Each plug shall be packed in cardboard box separately. A suitable number of such plugs, say 10 to 15, shall be packed in a big carton.

8.2 The packing for original equipment for engine manufacturers shall be subject to prior agreement between the purchaser and the manufacturer.

ANNEX A
(Clause 5.1)
RECOMMENDED SAMPLING PLAN

A-1 SCALE OF SAMPLING**A-1.1 Lot**

In any consignment, all sparking plugs of the same body reach and manufactured under similar conditions of production, shall be grouped together to constitute a lot.

A-1.2 The number of sparking plugs to be selected at random from the lot shall be in accordance with col 1 and 2 of Table 4 if required (*see A-3.2.1*), additional sparking plugs as given in col 3 of Table 4 shall also be selected at random.

Table 4 Sample Size and Criterion for Conformity
(Clause A-1.2)

Lot Size	<i>N</i> ₁	<i>N</i> ₂	<i>N</i> _{1+N} ₂	<i>C</i> ₁	<i>C</i> ₂	Sub-Sample Size
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Up to 150	13	13	26	0	1	3
151 to 280	20	20	40	0	3	4
281 to 500	32	32	64	1	1	5
501 to 1 200	50	50	100	2	1	6
1 201 and above	80	80	160	3	8	7

NOTE — If the sample size is greater than the lot size, all the plugs in the lot shall be inspected.

A-2 NUMBER OF TESTS

A-2.1 All the sparking plugs selected as in A-1.2 shall be inspected for dimension shown in Fig. 1 to 3 and for sparking under pressure [*see Table 3 SI No. (1)*].

A-2.2 The number of sparking plugs as given in col 7 of Table 4 shall be tested for insulation resistance under heat [*see Table 3 SI No. (ii)*], gas leakage under room temperature [*see Table 3 SI No. (iii)*], gas leakage under heat [*see Table 3 SI No. (iv)*],

thermal shock test [*see Table 3 SI No. (v)*], mechanical impact strength of insulator [*see Table 3 SI No. (vi)*], and torque strength [*see Table 3 SI No. (vii)*], these sparking plugs shall be taken from those selected in A-1.2.

A-3 CRITERION FOR CONFORMITY

A-3.1 The lot shall be considered as conforming to the requirements of this specification if the condition mentioned in A-3.2 and A-3.3 are satisfied.

A-3.2 The number of defective sparking plugs (sparking plugs which do not satisfy the requirement mentioned in A-2.1) out of the first sample *N*₁ shall not exceed *C*₁ as given in col 5 of Table 4. The lot shall be rejected if the number of defective sparking plugs is equal to or greater than *C*₂ as given in col 6 of Table 4.

A-3.2.1 If the number of defective sparking plugs is between *C*₁ and *C*₂, a further sample of *N*₂ sparking plugs as given in col 3 of Table 4 shall be selected and inspected for requirements mentioned in A-2.1. The number of defective sparking plugs out of the total *N*_{1+N}₂ sparking plugs shall not exceed *C*₂. The lot shall be rejected if the total number of defective sparking plugs is equal to or greater than *C*₂.

A-3.3 All the sparking plugs tested for the characteristics mentioned in A-2.2 shall satisfy the corresponding requirements. If one or more sparking plugs fail to satisfy any test(s), twice the number of sparking plugs shall be selected and tested for characteristics in which failure has occurred. All these sparking plugs shall satisfy the corresponding requirements.

ANNEX B
(Foreword)
COMMITTEE COMPOSITION

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Amendments Issued Since Publication

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